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RECALL OF NOUN PAIRS EMBEDDED IN CONNECTED DISCOURSE AS A FUNCTION OF ASSOCIATION STRENGTH.

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THREE GROUPS OF SUBJECTS WERE GIVEN A PASSAGE TO LEARN FOLLOWED BY A WRITTEN RECALL TEST. GROUP HA (HIGH ASSOCIATION) WAS GIVEN A PASSAGE WHICH INCLUDED 16 PAIRS OF ASSOCIATIVELY RELATED NOUNS. GROUPS LA (LOW ASSOCIATION) AND C (CONTROL) WERE GIVEN A PASSAGE CONTAINING ASSOCIATIVELY UNRELATED NOUNS. THE HA AND LA PASSAGES CONTAINED THE SAME STIMULUS WORDS, BUT DIFFERENT RESPONSES. THE C PASSAGE CONTAINED STIMULUS WORDS THAT WERE DIFFERENT FROM THOSE IN THE HA AND LA PASSAGES, BUT THE RESPONSES WERE THE SAME AS THOSE IN THE HA PASSAGE. FREE-ASSOCIATION NORMS WERE USED TO SELECT THE PAIRS. ON VARIOUS MEASURES OF RECALL OF PAIRS, GROUP HA WAS SIGNIFICANTLY SUPERIOR TO GROUPS LA AND C. THE RESULTS OF A CLOZE STUDY MADE IT POSSIBLE TO CONTROL FOR THE POSSIBILITY THAT RECALL OF HA PAIRS WAS FACILITATED BY CONSTRAINTS FROM THE REMAINING CONTEXT. HOWEVER, AFTER RECALL SCORES WERE CORRECTED FOR THIS FACTOR, THE RESULTS REMAINED THE SAME. THE RESULTS FOR TOTAL STIMULUS AND RESPONSE WORD RECALL WERE NOT CONSISTENT WITH THE RESULTS FOR PAIR RECALL. THIS ARTICLE, PART OF A PAPER GIVEN AT THE PSYCHONOMIC SOCIETY MEETINGS, OCTOBER 1966, APPEARS IN "STUDIES IN LANGUAGE AND LANGUAGE BEHAVIOR, PROGRESS REPORT IV," 1967, PUBLISHED BY THE CENTER FOR RESEARCH ON LANGUAGE AND LANGUAGE BEHAVIOR, UNIVERSITY OF MICHIGAN, 220 EAST HURON STREET, ANN ARBOR, MICHIGAN 48108. (AUTHOR/AMM)

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Recall of Noun Pairs Embedded in Connected Discourse as a Function of Association Strength[1]

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Three groups of Ss were given a passage to learn followed by a written recall test. Group HA was given a passage which included 16 pairs of associatively-related nouns; Groups LA and C were given a passage containing associatively unrelated nouns. The HA and LA passages contained the same stimulus words, but different responses. The C passage contained stimulus words that were different from those in the HA and LA passages, but the responses were the same as those in the HA passage. Free-association norms were used to select the pairs. On various measures of recall of pairs, Group HA was significantly superior to Groups LA and C. The results of a cloze study made it possible to control for the possibility that recall of HA pairs was facilitated by constraints from the remaining context. However, after recall scores were corrected for this factor, the results remained the same. The results for total stimulus and response word recall were not consistent with the results for pair recall.

In one of a series of studies (Rosenberg, in preparation) on the effect of associative habit upon the recall of connected discourse, one group of Ss was exposed to a simple narrative passage within which were embedded pairs of associatively-related words, and another group of Ss to the same passage but with the high-strength response words (R-words) replaced by low-strength items. On various measures of recall, the group exposed to the high association (HA) passage was superior to the group exposed to the low association (LA) passage. The strength of the associative constraints within the HA passage was confirmed by the results of a cloze study in which the stimulus words (S-words), and the R-words or both were deleted from the passages, and Ss were instructed to construct the missing items on the basis of the remaining context.

One difficulty with the interpretation of the recall data, however, is that it is possible that the high-strength R-words were of a kind that would be easy to learn even without the presence of their S-words. What would be needed to evaluate this possibility is a control (C) condition in which the high-strength R-words from the HA passage are retained, while the S-words are replaced by associatively-unrelated items. Such a control group was included in the present study, which was basically a replication of the previous one, with the exception of some minor changes in the text of the passages.

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Method

Subjects. There were 60 undergraduate Ss in the recall study and 20 undergraduate Ss in the cloze study. Participation was voluntary. The Ss in the recall study were assigned to the three experimental groups in rotation, as they appeared for the experiment.

Materials. The passages used in this study can be found in the Appendix. For the reader's convenience, the S-words are underlined and the R-words are in parentheses. The R-word for a given S-word is the item in the same sentence that is in parentheses. There are 16 S-R pairs in each passage. It will be noted that in all instances, an S-word precedes its R-word. Local free-association norms and the Minnesota norms (Palermo & Jenkins, 1964) were used to select key items. The R-words in the LA and C passages are either idiosyncratic responses or items that did not occur at all as responses to the S-words.[2] Only nouns were used as key items, and the various lists of S-words and R-words were comparable in Thorndike-Lorge (1944) frequency, as well as in length. Each passage was typed, double-spaced, on a ditto stencil and reproduced. Blank sheets of lined paper were attached to the back of each copy of a passage for use in the recall test.

For the cloze test, the S-words and R-words were deleted, and the Ss were given a passage that contained only the context that was common to the experimental passages. The cloze test material was also typed, double-spaced, on ditto stencils and reproduced. The Ss wrote their responses directly in the blanks in the passage.

Procedure. The data for the recall study were collected in a group-testing situation in two sessions. Thirty Ss were tested in each session, 10 Ss in each group. The fact that the instructions were identical for the three conditions made it possible to test the groups simultaneously. The Ss were told that their task was to try to learn as much of the passage as they could. They were permitted to study the materials for 1.5 min., immediately after which they were given a 7 min. written recall test. For the recall test, they were instructed to write down as much of a passage as they could remember, and to guess at items they could not remember.

The Ss in the cloze study were tested in a single session, and were instructed to guess the items that were deleted on the basis of the remaining context. The cloze test was not timed, and the Ss were urged to fill in all of the blanks.

Results

The recall protocols were scored for (1) S-words, (2) R-words, (3) pairs that occurred in the same sentence in the original S-R order (SSP), (4) total

pairs (TP) and (5) the percentage of S-words and R-words combined that were in the TP category (PP). The location of an S-word or an R-word in the recall protocol was not considered in the scoring of the first two measures. This was also the case for TP. The TP measure, however, included the SSP score plus all other cases in which both members of a pair were recalled, regardless of their location. In each of the experimental groups, virtually all of these cases were pairs in which the members were recalled in the same sentence, but in reverse order.

Since no significant interactions were found between sessions and the independent variables, the data from the two sessions were combined for the main analysis. Table 1 contains the means and SD's for the measures of recall just

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Insert Table 1 about here

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described. The order of means, from highest to lowest, on these measures is HA-LA-C. A two-way analysis of variance was carried out on the S-word and R-word data, and simple analyses of variance on the other measures. The Tukey Gap Test (Edwards, 1954) was used to evaluate the significance of the differences between adjacent means.

The difference between S-words and R-words was not found to be significant, $F(1,57) = .53$, $p > .05$, but the effect of association was, $F(2,57) = 4.19$, $p < .025$. However, the differences between Groups HA and LA and between Groups LA and C did not reach significance. This finding indicates that the significant main effect of association is due primarily to the difference between the extremes, Groups HA and C. These results are not consistent with the results of the previous study (Rosenberg, in preparation), where a significant difference was found between Groups HA and LA. The value of $F(2,57)$ for interaction was found to be 0.00.

The value of $F(2,57)$ for association on the SSP measure was 3.89 ($p < .05$), and on the TP measure, 6.05 ($p < .01$). On both of these measures, there was a significant gap ($p < .05$) between Groups HA and LA, but not between Groups LA and C. These results are consistent with the results of the previous study.

On the final recall measure (PP), the value of $F(2,57)$ for association was 6.89 ($p < .01$). Here, also, there was a significant gap ($p < .05$) between Groups HA and LA, but not between Groups LA and C. Thus, if one member of a pair was recalled, the probability of recalling the other member of the pair was highest when the words in the pair were associatively related. Curiously enough, in the previous study, Groups HA and LA were not found to differ significantly on this measure.

The results of the cloze study can be found in Table 2. Table 2 reveals

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Insert Table 2 about here

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that the constraints exerted by the context of the passages upon the critical words were not great. It is to be recalled that there were 16 S-words and 16 R-words in each condition. However, the context appears to have favored to some extent the HA R-words over the LA R-words, and the HA and LA S-words over the S-words in the C condition.

In order to rule out any possibility that the results of the recall study were a function of differential contextual constraints, a pair of words was eliminated from the HA passage if at least one of the words in the pair had been guessed correctly by more than 10 per cent of the Ss in the cloze study. The counterparts of these pairs were eliminated from the LA and C passages. This procedure resulted in the elimination of six of the 16 pairs in each condition. The recall protocols were then rescored on the basis of the 10 remaining pairs. The means and SD's for the corrected recall measures can be found in Table 3.

Insert Table 3 about here

The trends revealed by Table 3 are very similar to the trends that were revealed by Table 1. The results of the analyses of variance and the Gap tests for the corrected recall measures were identical with the results for the original scores. There is no reason to suspect, therefore, that the superiority of Group HA on pair recall was due to contextual constraints, rather than associative constraints within the pairs.

It should be mentioned here that the analysis of corrected scores was not carried out on the recall data in the previous study. However, as was pointed out earlier, the passages used in the present study (i.e., the HA and LA passages) were very similar to the passages used in the earlier study.

Discussion

Although the results of the present study and the results of the previous study differ in certain respects, it is clear that Ss in a learning task are sensitive to differences in the associative strength of pairs of words embedded in connected discourse. The lack of significant differences between Groups LA and C in the recall of pairs indicates that it was not some characteristic of the HA R-words that was responsible for the superiority of Group HA in the recall of pairs.

The generally low level of recall of S-words and R-words in Group C was most likely the result of some characteristic or characteristics of the words themselves, since this result appeared on both the corrected and the uncorrected measures of recall. The reason for the failure to find a significant difference between Groups HA and LA in the recall of S-words and R-words is not apparent. The experimental passages may possibly have been too easy for the Ss of the present study. This notion is consistent with the fact that the absolute effects of associative habit were not large.

Appendix

High association passage. *The man walked to the corner to meet the (woman). When he got there, they went together to a restaurant. As they entered, they passed a waiter who was moving a table up to a (chair). After they ordered, there was time to look at a newspaper, where there was a story about a king who was looking for a (queen). There was also a story about a priest who worked hard for his (church). On the front page there was a brief item about a lion that got into a fight with a (tiger). The editorial that day was on justice and (law). There order arrived, and everything looked good, especially the cheese and the (bread). He finished up with a nice fruit and she with an (apple) and some other things. After they finished, they took off for the city that was located just beyond the next (town). They were going to look at a house that they were considering turning into a (home). The place was located near a river and off in the distance one could see the (water). When they arrived, the owner was outside with a hammer, trying to remove a (nail) from something. The owner's head was large and his (hair) was dirty. The shoes that they noticed on his (feet) were old. Someone had left a needle and some (thread) on the ground. There were some kittens and some (cats) outside as well. After looking the place over, they decided it was just what they wanted.*

Low association passage. *The man walked to the corner to meet the (parent). When he got there, they went together to a restaurant. As they entered, they passed a waiter who was moving a table up to a (door). After they ordered, there was time to look at a newspaper, where there was a story about a king who was looking for a (nurse). There was also a story about a priest who worked hard for his (friend). On the front page there was a brief item about a lion that got into a fight with a (hound). The editorial that day was on justice and (age). Their order arrived, and everything looked good, especially the cheese and the (corn). He finished up with a nice fruit and she with a (egg) and some other things. After they finished, they took off for the city that was located just beyond the next (road).*

They were going to look at a house that they were considering turning into a (store). The place was located near a river and off in the distance one could see the (forest). When they arrived, the owner was outside with a hammer, trying to remove a (bell) from something. The owner's head was large and his (side) was dirty. The shoes that they noticed on his (porch) were old. Someone had left a needle and some (metal) on the ground. There were some kittens and some (guns) outside as well. After looking the place over, they decided it was just what they wanted.

Control passage. The guest walked to the corner to meet the (woman). When he got there, they went together to a restaurant. As they entered, they passed a waiter who was moving a wire up to a (chair). After they ordered, there was time to look at a newspaper, where there was a story about a poet who was looking for a (queen). There was also a story about a mayor who worked hard for his (church). On the front page there was a brief item about a goat that got into a fight with a (tiger). The editorial that day was on success and (law). Their order arrived and everything looked good, especially the juice and the (bread). He finished up with a nice dish and she with an (apple) and some other things. After they finished, they took off for the camp that was located just beyond the next (town). They were going to look at a station that they were considering turning into a (home). The place was located near a circle and off in the distance one could see the (water). When they arrived, the owner was outside with a jacket, trying to remove a (nail) from something. The owner's form was large and his (hair) was dirty. The spots that they noticed on his (feet) were old. Someone had left a mirror and some (thread) on the ground. There were some novels and some (cats) outside as well. After looking the place over, they decided it was just what they wanted.

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Footnotes

[1]Part of a paper given at the Psychonomic Society meetings, October 1966.

[2]Both forward and reverse associative strength were high in the HA pairs, and, conversely, both forward and reverse associative strength were low in the LA and C pairs.

Table 1

Mean and Standard Deviations for Various Measures of Recall

Group	Measure				
	S-words	R-words	SSP	TP	PP
HA					
Mean	10.00	10.10	7.85	8.70	86.05
SD	2.75	2.95	2.48	2.41	7.83
LA					
Mean	8.85	8.80	6.35	7.05	78.75
SD	1.87	2.61	2.11	2.16	8.00
C					
Mean	7.65	8.05	5.80	6.10	75.60
SD	2.48	3.12	2.55	2.57	11.17

Table 2

Mean Number of S-Words and R-Words Guessed Correctly in the Cloze Study

Condition	Measure	
	S-Words	R-Words
HA	1.70	1.50
LA	1.70	.20
C	0.00	1.50

Table 3

Means and Standard Deviations for Various Corrected Measures of Recall

Group	Measure				
	S-words	R-words	SSP	TP	PP
HA					
Mean	5.45	6.00	4.20	4.75	81.95
SD	2.19	2.20	1.96	1.92	10.04
LA					
Mean	5.00	4.80	3.20	3.55	68.90
SD	1.49	2.14	1.73	1.82	16.16
C					
Mean	3.60	4.15	2.55	2.80	62.05
SD	1.73	2.41	1.85	1.88	31.18